The Effects of Entity and Incremental Views of Ability and Goal Orientation on Performance.

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This thesis contains no material which has been accepted for the award of any other higher degree or diploma in any University, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Literature Review

Abstract

This review assesses the implications of implicit views of ability; comparing the belief that intelligence is a stable, unchangeable trait (an entity view) with the belief that it is a repertoire of skills that can be expanded upon with learning and practice (an incremental view). Links between views of ability and goal orientation are examined, focusing on social comparison goals (where the primary aim is to vindicate one's ability in the eyes of other people) and mastery goals (where the primary aim is to achieve a criterion level of performance). A social-cognitive model examining these associations is assessed and the behavioural consequences of endorsing each of the fore-mentioned views of ability are highlighted. Links between views of ability and confidence in ability, attributional tendencies, as well as gender and age differences are also explored. Research suggests that people holding an incremental view of ability are more likely to pursue mastery goals resulting in more adaptive learning patterns, greater persistence and feeling challenged by failure. While people holding entity views are more likely to subscribe to social comparison goals resulting in less adaptive behaviours, such as decreased persistence. Further research assessing the extent to which experimental findings are generalisable to naturalistic settings is advised, as well as the role of persistence as it relates to views of ability and goal choice.

Individuals have theories about intelligence that they are not able to articulate. As such they take the form of background assumptions or implicit theories. These implicit views held by individuals' can greatly affect achievement behaviours. It is thought that differences in how individuals view intelligence affect achievement behaviour especially when faced with difficult tasks (Ablard & Mills, 1996; Dweck & Bempechat, 1983; Henderson & Dweck, 1990).

One influential model related to achievement behaviours is that of Dweck's social-cognitive model of motivation (1986; Dweck & Leggett, 1988). This model suggests that implicit theories regarding the stability of intelligence orient individuals toward different goals. In turn, these goals set up and organise different patterns of behaviour. Although these theories, goals, and patterns are initially unrelated to achievement, they begin to predict achievement over time (Dweck, 1991) and as such are important to investigate.

Implicit Theories of Intelligence

Dweck (Dweck & Bempechat, 1983) and Nicholls (1984) have both proposed that children tend to endorse one of two implicit theories of intelligence, conceptualising ability as either a fixed entity: an "entity" view, or as a flexible, acquirable skill: an "incremental" view (Bempechat, London, & Dweck, 1991). According to Dweck (1996), individuals' holding these two types of implicit theories ("entity" and "incremental") vary in their view of the stability of intelligence and the role of effort.

Individuals with an entity view of ability see intelligence as a fixed trait, a personal quality that cannot be changed. Individuals endorsing this view believe that although people can learn new things, a person's general underlying intelligence remains the same (Ablard & Mills, 1996; Dweck, 1991; Dweck, Chiu & Hong, 1995a). In contrast, people

with an incremental view of ability are said to view intelligence as a changeable quality that can be increased and cultivated through effort. It is this link to effort or preference for challenge that makes implicit views so important (Dweck, 1996). For instance, individuals with an incremental view of intelligence are more likely to be motivated in the face of setbacks and to increase their effort in an attempt to master a task or increase their knowledge (Dweck, Chiu & Hong, 1995a; Leondari & Gialamas, 2002). An individual with an entity view of ability is more concerned with performance as compared with others than with mastery, and as such may avoid challenging tasks where there is risk of failure. People with an entity view of ability are more concerned with appearing competent than with acquiring and mastering new skills (Ablard & Mills, 1996). Dweck and Leggett (1988) summarise the differences between the two views of ability as either predicting, "whether individuals will be oriented toward developing their ability or toward documenting the adequacy of their ability" (p. 263). Given that individuals with entity views of intelligence are less likely to exert effort on challenging tasks and may even avoid such tasks, it is possible that they may not reach their academic potential (Ablard & Mills, 1996).

The Usefulness of Implicit Views of Ability

Much of the research to date has focused on the detrimental effects of holding an entity view of intelligence. However, Dweck, Chiu and Hong (1995b) stress that both entity and incremental views of ability have potential costs and benefits. Research has found fewer costs for the individual who holds an incremental view of ability and fewer benefits for those adopting an entity view of ability (Dweck, Chiu & Hong, 1995b). In any given domain such as intelligence, social or moral, people with an entity view of ability compared to those with an incremental view often display less adaptive or effective functioning. For example, people with an entity view of ability can sacrifice

learning opportunities and turn away from challenges, limiting the acquisition of skills and knowledge that would maximise future successes. They can exhibit less persistence and show greater negative affect. Ablard and Mills (1996) focus on the role effort plays within the implicit view framework and state that because effort is needed when learning novel and complex material, an incremental view of ability has been shown to be most adaptable when students are learning new material.

While the benefits of an incremental view have been widely discussed, such a view could be detrimental when an individual is unable to come to terms with his or her own personal limits (Dweck, Chiu & Hong, 1995b). That is, believing in the malleability of attributes, people might persist at something for which they are unsuited. Dweck, Chiu and Hong (1995b) give the example of an individual training to be a concert pianist despite the fact that his or her ability and rate of progress makes success unlikely. Ablard and Mills (1996) suggest that the most adaptable view across situations may be a borderline view as it should be flexible and easily modified to match the learning environment. However, longitudinal studies need to be undertaken to fully determine the adaptability of views of intelligence across different situations. In order to obtain an understanding of the research on implicit views of ability, knowledge of the way in which peoples' implicit theories of intelligence are assessed is needed.

Assessment of Implicit Theories

Historically, implicit theories have been assessed as if they are dichotomous (e.g., Bempechat, London & Dweck, 1991; Dweck & Leggett, 1988), and assessed as either entity or incremental (Ablard & Mills, 1996). According to Ablard and Mills (1996) treatment of views in this manner is limiting and they suggest an alternative is to rate beliefs on a continuum that allows for a greater range in the stability of views of ability and the possibility of borderline views.

The most popular method for assessment, although not the only method, is by means of the Implicit Views of Ability scale, developed by Hong, Chiu and Dweck (1995). This questionnaire consists of three items, each of which depicts intelligence as a fixed entity. No items depicting intelligence as incremental are used as a review of several studies found that those disagreeing with the entity statements, when asked, give clear incremental view responses as justification (Dweck, Chiu & Hong, 1995a). The three items are: (1) "You have a certain amount of intelligence and you can't really do much to change it", (2) "Your intelligence is something about you that you can't change very much", and (3) "You can learn new things, but you can't really change your basic intelligence". Participants are asked to show their degree of agreement with each item on a 6-point Likert scale, where 1 is "strongly agree" and 6 is "strongly disagree". The higher the score, the more an individual disagrees with an entity view of intelligence. Typically studies have shown that 42.5% of respondents to the questionnaire agree consistently with an entity view, and about the same disagree with such a view. Approximately 15% have unclear or mixed theories and are generally excluded from analyses (Hong, Chiu & Dweck, 1995).

A review of data from six validation studies by Dweck, Chiu and Hong (1995a) found the implicit theory of intelligence measure to have high internal reliability across studies; αs ranged from .94 to .98. The test-retest reliability after a 2-week interval was .80. In establishing the questionnaire's validity, the implicit theory measure was found to be independent of participants' sex, age, political affiliation and religion. They also found the measure to be unrelated to measures of cognitive ability, confidence in ability and self-esteem (Dweck, 1996). The most frequently used implicit theory measure appears to be a reliable measure of its construct.

A Social-Cognitive Model of Motivation

Goal orientation theory has been used widely by researchers to understand different cognitive and motivational patterns within the achievement domain (Ames, 1992; Dweck, 1986). Two contrasting goals have proven to be helpful in understanding adaptive and maladaptive patterns of behaviour: "social comparison" goals and "mastery" goals. When oriented towards mastery goals, individuals are concerned about developing their ability and skills, whereas, when oriented towards social comparison goals individuals are concerned with demonstrating their ability (Dweck & Leggett, 1988; Kaplan & Midgley, 1997). The model proposed by Carol Dweck and colleagues (Dweck & Elliott, 1983; Dweck & Leggett, 1988) suggests that individuals' implicit theories of intelligence are linked to particular goal orientations and it is these goals that bring about different types of cognitive, affective and behavioural patterns. More specifically, people holding an entity view of ability are more likely to pursue *social comparison* or *performance* goals and be concerned with gaining favourable judgements of their ability compared with others, resulting in maladaptive learning patterns that are more vulnerable to failure, such as helplessness (Dweck & Leggett, 1988).

On the other hand, people with an incremental view of ability seek to increase their competence and are more likely to pursue *mastery* or *learning* goals resulting in more adaptive learning patterns, greater persistence, and feeling challenged by failure (Clark & Tollefson, 1991). Dweck and Leggett (1988) argue that there is no direct relationship between implicit theory and behavioural response. Rather the relationship is moderated by the type of goal orientation assumed by the individual (Roedel & Schraw, 1995). Therefore there are three aspects to this proposed theory: (1) The implicit view of intelligence (or other domain, such as social or moral) is directly linked to the type of goal orientation an individual is likely to endorse, (2) The type of goal orientation

endorsed by an individual leads to characteristic behavioural responses, especially acute when the individual is faced with failure, and (3) There is no direct link between implicit theory and behavioural response, which is mediated by goal orientation. This link between views of ability (either entity or incremental) and goal orientation has been used to describe a range of achievement behaviours.

Goal Orientations

The majority of research relating to academic goals has been conducted within the framework proposed by Dweck and Leggett (1988). Research has consistently indicated that people with an incremental view of ability pursue mastery goals whereas those with an entity view of ability pursue social comparison goals, gaining positive judgements of their intellectual ability or preventing negative judgements of it (Braten & Ollausen, 1998; Dweck & Leggett, 1988). Several studies have attempted to test this aspect of Dweck and Leggett's (1988) theory (Ames & Archer, 1988; Roedel & Schraw, 1995).

Ames and Archer (1988) proposed that holding an entity view of ability would predict a preference for social comparison goals, goals concerned with judgements of ability – gaining favourable judgements and avoiding unfavourable ones. Whereas holding an incremental view of ability would predict a preference for mastery goals; goals concerned with developing one's ability. In their study, and later in a study of 8th grade children (Dweck & Leggett, 1988), they measured students' theories of intelligence and then gave them a choice of pursuing mastery or social comparison goals. In both studies they found significant relations between the theories of intelligence the students endorsed and the goal they chose to pursue on an upcoming achievement task.

In their study of 8th grade children Dweck and Leggett (1988), found more than 80% of children with an entity view of ability selected social comparison goal tasks, with 50% of those endorsing an entity view choosing a task that was so easy that it eliminated any

risk of failure. On the other hand more than 60% of children with an incremental view of ability selected mastery goal tasks, with less than 10% choosing the easy task (Dweck, 1996). Using an adult population Roedel and Schraw (1995) also attempted to test the validity of this hypothesis by using a 25-item Likert-style questionnaire almost identical to Roedel, Schraw and Plake's (1994) Goals Inventory, identifying mastery or social comparison orientations. They predicted a correlation between implicit view scores and scores on the inventory. They found that believing intelligence to be a fixed entity (entity theory) was correlated with the social comparison goal orientation, thus lending further support to Dweck and Leggett's model.

Dweck (1996) further explains the differences between the two types of goals by indicating that individuals oriented towards social comparison goals are primarily interested in obtaining positive evaluations of their ability while trying to avoid negative ones (Miller, Behrens, Greene & Newman, 1993). They would rather receive a positive evaluation on a relatively easy task than run the risk of receiving a negative evaluation on a more challenging task, hence their preference for the easier task when given a choice. Linked to this is the finding that the more effort an individual expends, the more negative they will perceive the result, as effort is seen as indicating limited ability (Dweck, 1996). On the other hand those oriented towards mastery goals are more concerned with acquiring new skills or improving their knowledge, even if it means they make some mistakes on more challenging tasks while they are learning (Miller, et al., 1993).

Considerable research has examined the second part of Dweck and Leggett's (1988) theory that goal orientation is related to behavioural responses and have generally documented that a mastery goal orientation is associated with more adaptive patterns of behaviour, cognition and affect than is a social comparison orientation (Ames & Archer,

1988; Anderman & Midgley, 1997; Dweck & Leggett, 1988). For instance, using self-report measures, Archer (1994) found that college students oriented towards mastery goals reported greater use of effective learning strategies, more positive affect and were more likely to choose harder tasks than students oriented towards social comparison goals, thus lending further support to previous research.

In relation to goal orientation and task selection (either selecting similar and easier tasks or more challenging tasks) as an indicator of behavioural responses, Roedel and Schraw (1995) found support for Dweck and Leggett's model. They found choosing a more challenging task to be marginally related to mastery goals, but unrelated to social comparison goals. This study, as with others (e.g., Leondari & Gialamas, 2002; Miller, et al., 1993), found mastery and social comparison orientations to be independent, suggesting that individuals may be high or low on both goal orientations simultaneously (Roedel & Schraw, 1995).

Research into academic goal orientations has consistently found mastery goals to have adaptive consequences. However some inconsistencies have been documented regarding social comparison goals, which are sometimes found to be adaptive and sometimes maladaptive learning strategies (Leondari & Gialamas, 2002). Previous studies have almost universally found mastery goals to be positively related to academic achievement (Meece & Holt, 1993; Midgley & Urdan, 1995). However social comparison or performance goals have sometimes been found to be positively related to achievement (Archer, 1994; Midgely & Urdan, 1995), and sometimes either unrelated or negatively related to academic achievement (Meece, et al., 1988; Schraw, Horn, Thorndike-Christ, & Bruning, 1995).

As mentioned earlier, no such inconsistencies exist in the mastery goal orientation (Miller, et al., 1993). It has been suggested that these inconsistencies have arisen due to

a failure to distinguish between the approach (desire to demonstrate ability) and avoidance (desire to avoid a conclusion of low ability) components of achievement goals. The majority of the goal research to date has focused on the "approach" aspect rather than the "avoidant" aspect (Middleton & Midgley, 1997; Pintrich, 2000).

Leondari and Gialamas (2002) attempted to examine both the approach and avoidance components of achievement goals. In their study they looked at three goals: mastery (goal of acquiring a new skill), performance–approach (goal to demonstrate competence), and performance–avoidance (goal to avoid demonstration of incompetence). Using correlational data from 451 participants, they found mastery and performance–approach goals, and performance-approach and performance-avoidance goals to be correlated in line with previous research (Elliott & Church, 1997; Midgley & Urdan, 1995). The correlations were low enough for them to conclude that the three goal orientations form distinct factors. As the majority of studies have not separated the approach and avoidance aspects of the goal orientation out, more research into this is necessary. Although research based on the revised goal theory is recommended, Pintrich (2000) reports that both the revised goal theory perspective including approach and avoidant aspects, and the earlier theories are applicable to the development of motivation and achievement.

Reactions to Setbacks or Achievement Failure: 'Helpless' or Mastery-Oriented Coping

Within the achievement literature much research has focused on how people respond to failure or negative setbacks. Bempechat, London and Dweck (1991) devised a study assessing the degree to which beliefs about intelligence would predict recovery from failure on a novel achievement task. Results demonstrated that children's theories of intelligence predict their recovery from failure in an achievement situation. The relationship between children's theories of intelligence and their recovery from failure

was measured by the time discrepancy between their upper limit during the training and retest phases of the Tower of Hanoi task. For fifth-graders, children with an entity view of ability took significantly longer than children with an incremental view of ability to complete problems after failure, despite having no significant difference on the initial training measures. For third-graders, no significant differences were observed.

Dweck and colleagues (Dweck, 1986; Dweck, Chiu & Hong, 1995a) have consistently maintained that students' implicit theories of intelligence, moderated by goal orientation, affect their use of adaptive strategies and behavioural responses in achievement situations. For example, one well-documented phenomenon is that on encountering failure or achievement setbacks, individuals seem to respond in one of two ways; either in an adaptive *mastery-oriented* fashion; characterised by the seeking and enjoyment of challenge, persistence, and the generation of effective problem-solving strategies or in a *'helpless'* way; characterised by risk avoidance, self-denigrating thoughts, negative affect, lack of persistence, and poor performance following failure (Dweck, 1996).

These patterns have been identified in populations ranging from pre-school-aged children through to adults. It is important to note that the individuals displaying these two patterns do not differ in actual ability, but in their level of achievement especially following achievement setbacks (Cain & Dweck, 1995; Chiu, Hong & Dweck, 1994). A study by Henderson and Dweck (1990) linked individuals' views of ability directly to the mastery-oriented or helplessness pattern. Dweck, Hong and Chiu's (1993) review of several studies measuring students' theories of intelligence and using them to predict reactions to false failure feedback on ability tests one week later supports this finding. They found that people with an entity view of ability displayed a more helpless pattern than people with an incremental view of ability in terms of cognitive appraisal and

behavioural persistence. For example, fewer people with an entity view of ability than with an incremental view of ability chose to work on the same task following failure feedback (Chiu, Hong & Dweck, 1994).

Henderson and Dweck's (1990) study assessed children's implicit theories of intelligence and used this measure to predict academic performance over the transition from grade school to junior high. As predicted children with an incremental view of ability tended to show a mastery-oriented pattern and children with an entity view of ability a helpless pattern. Clark and Tollefson's (1991) study of 116 gifted high school students classified by teachers as being mastery-oriented, helpless or neither, also showed support for the predicted differences between the implicit theories of intelligence held by mastery-oriented and helpless students.

An additional body of literature again based on Dweck and Leggett's (1988) social-cognitive model links goal orientation with the mastery-oriented and 'helpless' reactions. This is based on the theory that individuals' implicit view of intelligence orients them towards particular goal orientations, which in turn predisposes them to either a mastery-oriented or a "helpless" response. Specifically the theory links the setting of social comparison goals to the helpless response.

This hypothesis that an emphasis on social comparison goals sets up the helpless response has been tested in a number of ways. In an early study, Elliott and Dweck (1988) *experimentally induced* an emphasis on social comparison or mastery goals, either by heightening the evaluative aspects of the situation or emphasising the value of the task to be learned in order to examine differences in goal preferences and their relation to response patterns in the face of challenges. They experimentally induced students to adopt either social comparison or mastery goals, and found that pursuing social comparison goals produced vulnerability to helpless behaviour, while pursuing

mastery goals promoted mastery-oriented behaviour. Elliott and Dweck (1988) found that children in different experimental conditions did not differ in performance before failure was introduced. However, those who were experimentally induced to social comparison goals displayed more negative cognitions, more negative affect, and greater deterioration in their problem-solving strategies under failure compared to those induced to pursue mastery goals (Chiu, Hong, & Dweck, 1994).

Results from a study measuring children's *natural* goal orientations (Smiley & Dweck, 1994) indicated that following failure children focused on a social comparison goal (obtaining positive judgements of their competence and avoiding negative ones) were more likely to react with helplessness. In contrast, those focused on a mastery goal (trying to improve and increase their abilities) were more likely to display mastery-oriented behaviours (Erdley, Cain, Loomis, Dumas-Hines, & Dweck, 1997). This research supports Dweck and Leggett's (1988) social-cognitive model of motivation where implicit views of ability are related to goal orientation, which in turn is linked with different behavioural response patterns. These behavioural response patterns become particularly divergent following failure.

Behavioural Correlates linked with Implicit Theory and Goal Orientation

As has been described, personal or implicit theories of intelligence are unrelated to actual ability as assessed by measures of intelligence, but they have a definite impact on cognition and behaviour in academic situations, especially following failure (Dweck & Bempechat, 1983). In assessing Dweck and Leggett's (1988) model much research has been undertaken into the part that other factors may play in mediating behavioural responses and whether these are independent of or closely linked with implicit views of ability and goal orientation. The model has linked implicit views of ability (particularly,

the entity view and social comparison goal endorsement), to a number of behavioural correlates and learning strategies. For instance, some of these include self-esteem, self-handicapping, anxiety, confidence in ability and attributional tendencies.

Implicit Views of Ability, Goal Orientation and links with Confidence in Ability

Consistent findings of a link between self-confidence and achievement have not been found (Hong, Chiu & Dweck, 1995). While some researchers have found significant correlations between self-confidence about one's intellectual ability and achievement outcomes (Hattie, 1992; Marsh, 1984), others have found only weak associations (Hansford & Hattie, 1982). As a result, it has been more recently thought that confidence in one's ability does not greatly affect how people respond in achievement situations (especially to failure), but rather that it is people's conceptions or theories of intelligence that predict reactions to achievement setbacks. These theories predict when confidence in ability will or will not affect achievement outcomes (Hong, Chiu & Dweck, 1995). A study measuring response latencies to highly charged 'ability' words such as "smart"/"dumb" following failure, found that it was people's implicit views of ability, not their confidence in their ability that affected response times. In the failure but not the control condition, people with an entity view of ability took significantly longer to respond to ability words than people with an incremental view irrespective of their confidence in ability (Hong, Chiu & Dweck, 1995).

Just as for implicit theory, research focusing on Dweck's goal orientation theory has shown some inconsistencies throughout the literature regarding the importance of confidence in ability in predicting goal orientation and responses to challenge (Miller, et al., 1993). One such inconsistency is the failure to find support for the predicted interaction between dominant goal orientation and perceived ability or confidence in ability.

One prediction of Dweck's (1996) extension of the model is that the behaviour of individuals with differing goal orientations, namely social comparison or mastery, will depend on their confidence in their ability (Miller, et al., 1993). Research suggests that when individuals with either goal orientation are confident in their ability their behaviour and performance is quite similar. It is when individuals doubt their ability that differences in motivation are revealed. Elliott and Dweck (1988) found that individuals oriented towards social comparison goals with low confidence in ability chose less challenging tasks, decreased their performance, reported greater negative affect and were less persistent than individuals oriented towards social comparison goals with high confidence in ability or individuals with a mastery goal orientation regardless of their ability perceptions.

In contrast to this, Miller, Behrens, Greene and Newman's (1993) study on 117 students found no significant correlation between confidence in ability and persistence as predicted by Dweck's theory (Dweck & Leggett, 1988). This is contrary to previous research findings, which found perceived ability to be related to effort expenditure (Leondari & Gialamas, 2002). This demonstrates some inconsistencies within the literature to date and suggests that persistence may not be linked to perceived ability, but rather to goal orientation and valuing of the outcome, the latter two of which are directly influenced by implicit views of ability (Dweck, 1996; Leondari & Gialamas, 2002).

Regardless of their level of self-confidence in their ability, people with an entity view of ability have a significantly greater tendency to infer low ability from failures or setbacks than do those with an incremental view of ability (Hong, Chiu & Dweck, 1995). This suggests that confidence in ability is more vulnerable within an entity framework. It has been found that entity theorists have higher performance standards than incremental theorists (Ablard & Mills, 1996). Individuals with an entity view of ability

not only seem more likely than people with an incremental view to make ability inferences from failure (given these high standards for success) but also may be more likely to experience "failure" in the course of learning.

Individuals holding an incremental view of intelligence seek to achieve mastery, seek challenge and display persistence in the pursuit of goals irrespective of their self-concept of ability. The entity view of ability appears to be dependent on individuals' confidence in their ability, whether linked to a mastery orientation when the individual's perceived level of ability is high, or to a helpless orientation when the individual's perceived level of ability is low (Miller, et al., 1993).

In a study following the procedures used by Miller, et al. (1993), Kaplan and Midgley (1997) attempted to test whether confidence in ability moderates the relationship between goal orientation and adaptive or maladaptive behaviour. They found little support for confidence in ability moderating social comparison goals and the use of learning strategies. This result is in contrast to Dweck's theory (Dweck & Leggett, 1988) that confidence in ability is a particularly important influence on achievement behaviour especially for those individuals endorsing a social comparison goal orientation.

Kaplan and Midgley's (1997) findings may be attributed to differences in measurement and design. For instance, many of Dweck's studies (Elliott & Dweck, 1988; Smiley & Dweck, 1994) are laboratory-based, examining a specific task, whereas Kaplan and Midgley's (1997) study was based on multiple activities in an academic setting. Also, the tasks used in Dweck's studies are usually novel and therefore unfamiliar, whereas in Kaplan and Midgley's (1997) study students were required to reflect on familiar academic tasks. This indicates inherent differences in the research of

this area, in particular laboratory versus field studies, and also differences in short-term versus long-term naturalistic studies.

Implicit View of Ability, Goal Orientation and Links to Self-Esteem

According to Dweck's research it also follows that students who view ability as something that can be increased through effort are more likely to exhibit a higher degree of motivation and higher self-esteem (Clark & Tollefson, 1991). As such it has been suggested that people with entity views of ability may have lower global self-esteem than individuals subscribing to an incremental view of ability. However, on average, people with an entity view of ability do not appear to have lower global self-esteem than those with an incremental view of ability (Hong, Chiu & Dweck, 1995). Hong, Chiu and Dweck (1995) found the correlation between scores on a measure of implicit theory and a self-esteem scale to be nonsignificant (r=.001, p=.99) in a sample of 55 students, suggesting that implicit view and level of global self-esteem are not related. It may be that for individuals with an entity view of ability self-esteem may fluctuate more than for those with an incremental view (Hong, Chiu & Dweck, 1995). A longitudinal study would be able to test this hypothesis.

It has been suggested that differences in self-esteem may be directly related to implicit theories and goals (Rhodewalt, 1994). Rhodewalt's (1994) study of 80 psychology undergraduates assessed implicit view of ability, goal orientation and self-esteem, and found partial support for level of self-esteem predicting the belief that abilities can be improved with effort (incremental view of ability) and the endorsement of mastery goals.

Implicit View of Ability, Goal Orientation and Affective Responses

Implicit views of ability have been shown to have some effect on emotions. Zhao and Dweck (1994) gave participants with entity and incremental views of ability actual and

hypothetical failures to respond to. Three scenarios describing academic setbacks were read out to participants and they were asked what they would think, feel and do in response to each one. Those with an entity view of ability showed more negative responses to both, with a greater number of global negative inferences ("I would think I was a loser", "a failure", "stupid", etc) than participants with an incremental view of ability. Participants with an entity view of ability also showed significantly more negative affect and less constructive problem solving than those holding an incremental view.

Although the link between goal orientation and strategy use has been well established, little attention has been paid to the relationship between goal choice and affect. Several studies examining this relationship have found a mastery goal orientation to be related to positive indices of affect, while social comparison goals have either been negatively related or unrelated to affect (Miller, et al., 1993). For instance Seifert's (1995) study of fifth-grade students found positive emotions to be more strongly correlated with a mastery orientation than with a social comparison orientation, while negative emotions were found to be negatively related to mastery goals and unrelated to social comparison goals. He goes on to state that the study "provides preliminary evidence that goal pursuit can be predicted by emotions and that particular goals are associated with particular emotions" (Seifert, 1995, p.546).

Implicit View of Ability, Goal Orientation and Links with Anxiety

The two implicit theories have been linked to differences in levels of performance anxiety in achievement situations. A study inducing conceptions of ability in 76 computer trainees, found those in the incremental condition experienced a significant decrease in computer anxiety between pre- and post-training assessments, while trainees in the entity condition experienced no change in anxiety (Martocchio, 1994). Those in

the entity condition also demonstrated lower self-efficacy beliefs than in the incremental condition.

Implicit View of Ability, Goal Orientation and Links with Attributions

It has also been suggested that views of ability can be seen as affecting cognitive dispositions or motivational factors such as attribution patterns and locus of control (Clark & Tollefson, 1991). Individuals holding an incremental view of intelligence would most likely have an internal locus of control and attribute success outcomes to effort or ability and failure to lack of effort. In comparison, individuals holding an entity view of ability may have either an internal or external locus of control. However, faced with failure, individuals with an entity view of ability would most likely attribute failure to stable factors such as low ability or task difficulty. In turn, this could lead to a helpless reaction. In fact previous studies have consistently shown an entity view of ability to be positively associated with the tendency to make internal, global and stable attributions for behaviour and achievement outcomes (Dweck, Chiu, & Hong, 1995a; Dweck, Hong & Chiu, 1993).

Hong, Chiu, Dweck, Lin and Wan (1999) conducted a number of studies assessing whether an incremental view versus an entity view would predict effort versus ability attributions, which would then lead to mastery-oriented achievement behaviours. Study 1 revealed, when given negative feedback, incremental theorists were indeed more likely than entity theorists to attribute that feedback to effort. Recent research suggests that it is an individual's implicit theory rather than their goal orientation that predicts attributions following failure. This is a slightly different view from Dweck and Leggett's (1988) original theory that states that implicit theories predict goals. These goals then predict subsequent attributions and behavioural responses (Hong, et al., 1999). It has since been concluded that implicit theories of ability are able to directly influence

achievement related behaviours, irrespective of achievement goals (Hong, et al., 1999; Ommundsen, 2003). For example, a study by Erdley, Cain, Loomis, Dumas-Hines, and Dweck (1997) supports this view. These researchers primed children of both implicit views, with either mastery or social comparison goals prior to trying out for a pen pal club. They were then made to experience a minor rejection and asked to make attributions for that setback. Children with an entity theory made significantly stronger low-ability attributions than incremental theorists, regardless of the goal orientation imposed on them.

Implicit View of Ability, Goal Orientation and Age

In relation to age and differences in implicit views of ability, the research to date has yielded inconsistent findings. For example, adults have been found to be more entity-oriented than school children (Ablard & Mills, 1996), although other studies have found no differences between older and younger children (Bempechat, London & Dweck, 1991). Bempechat, London and Dweck (1991) compared younger students (grades K-2) with older students (grades 3-5) and found no significant differences in the stability of intelligence between the two groups. On the other hand a non-experimental study of 153 "academically talented" students found that beliefs in the stability of intelligence (an entity view of ability) increased with age, with high school students endorsing entity views more than primary school-aged students (Ablard & Mills, 1996). Leondari and Gialamas (2002) also found that younger students adopted more than older ones an incremental view of ability. A possible explanation of this age difference is given by Ablard and Mills (1996), they suggest that with age individuals obtain a greater awareness of society's emphasis on performance relative to others, and as such tend to adopt a more stable view of ability.

In relation to goal orientation and differences with age Midgley, Anderman and Hicks (1995) found that high school students endorsed social comparison goals more and

mastery goals less than primary school students. However, opposite results were found in a study by Burley, Turner and Vitulli (1999) of 199 college students ranging in age from 17 – 59 years assessing the relationship between goal orientation and age using a 25-item self-report goals inventory from Roedel, Schraw and Plake (1994). This study found that older students were more likely to be mastery-oriented than younger students. If this finding can be replicated, it is possible that grouping students of various ages together could support the development of a mastery orientation in younger students (Burley, Turner & Vitulli, 1999).

Implicit View of Ability, Goal Orientation and Gender

Schommer and Dunnell (1994) studying high school students found boys to endorse an entity view more so than girls. However, other studies have found no gender differences between individuals endorsing an entity or an incremental view of ability (Ablard and Mills, 1996; Leondari & Gialamas, 2002). Therefore the available research appears inconsistent in understanding the relationship of gender and implicit views of ability.

Studies of achievement goal orientation provide some evidence that boys are more oriented toward social comparison goals and less oriented to mastery goals than are girls (Anderman & Midgley, 1997; Roeser, Midgley, & Urdan, 1996). A survey-based study of the transition from 5th grade to 6th grade of 341 students found female children reported being more mastery focused than male children in English but not in mathematics (Anderman & Midgley, 1997). Across domains, boys reported higher mean levels of social comparison goals than girls. As for age, differences in implicit views of ability and goal choice across gender are not yet understood.

Implicit View of Ability, Goal Orientation and Links with Performance

While there is much research to support the notion that cognitions and affect are affected by implicit views of ability, there is less support for implicit views being directly related to academic achievement in terms of outcome or performance (Bempechat, London, & Dweck, 1991). Dweck (1996) suggests that neither implicit view of ability, whether entity or incremental, has great effects on academic performance during early school years (for example, while in primary school), but that as academic work becomes more difficult and persistence in the face of failure is required, then implicit view of ability begins to predict actual achievement.

Studies of children exhibiting maladaptive patterns have shown that they are hampered in learning new material under conditions that involve periods of failure or confusion (Dweck, 1991). However, in a primary school setting (grade school), these children are equivalent in achievement to children with more adaptive responses. Thus, even though they show clear debilitation in the face of failure in studies (either in a laboratory or a classroom setting), they show no evidence of an achievement deficit. Dweck's (1991) explanation of this is that it is not until high school that the challenge of the work expected from students is such that it evokes a helpless response.

To test this hypothesis Henderson and Dweck (1990) followed 7th grade students through their transition to junior high school. They asked the question "would children's theories of intelligence predict their gains and losses in academic achievement over this challenging transition?" Results demonstrated that entity theorists' academic results deteriorated, while incremental theorists' academic results showed clear gains. They also found that student's confidence in their ability, unlike implicit theories, did not predict their achievement. Entity theorists also displayed characteristics of the helpless pattern, with more negative inferences, greater negative affect and poor performance.

Implicit theories of ability, goals and behavioural patterns are initially unrelated to actual ability; they do however begin to predict achievement levels over time.

Implicit View of Ability, Goal Orientation and Links with Persistence

The perceived relationship between effort and ability held by individuals who pursue social comparison goals helps to explain the negative affect and lack of persistence characteristic of the helpless response (Clark & Tollefson, 1991). For those individuals pursuing social comparison goals, high effort or persistence at a task, signifies low ability. Much research has shown that goal orientation influences task selection giving investigators a behavioural index of persistence (Cain & Dweck, 1995).

The majority of the research to date has indeed examined persistence by employing a behavioural index measure of non-persistence, that is they have measured persistence or lack thereof, by the individual's decision to repeat a previously solved puzzle or to choose an easy versus a challenging task (Cain & Dweck, 1995; Elliott & Dweck, 1988; Smiley & Dweck, 1994). In most cases, non-persisters are distinguished from persisters on the experimental tasks, and then these two groups are compared on a range of measures to determine whether the non-persisters display more characteristics of the "less adaptive" helpless pattern.

Studies by Cain and Dweck (1995) and Smiley and Dweck (1994) both examined responses to challenging puzzles depicting cartoon characters. Participants were identified as non-persisters if they chose to re-do an already completed puzzle. Smiley and Dweck's (1994) study found that non-persisters had many characteristics of the helpless pattern, for instance, they tended to make attributions to low ability, negative verbalizations and showed a greater decline in affect than persisters. Cain and Dweck's (1995) study of 139 children asked participants to estimate how many puzzles they could complete if they were given a set similar to the trial set they were exposed to. Thirty –

one percent of non-persisters thought they would be able to solve none or only one of the new puzzles, whereas only 5.3% of the persisters were this negative (Dweck, 1991). They also found the helpless pattern of non-persistence to be related to the entity theory of intelligence, even in children as young as the first grade. Elliott and Dweck (1988) found mastery-oriented individuals chose a challenging task more often than social comparison oriented individuals. Archer (1994) found similar results in a study among college students, evidenced by strong positive correlations between a mastery orientation and an individual's choice of a difficult task, and a negative correlation with their choice of an easy task.

Dweck, Hong and Chiu (1993) report that individuals with an entity view of ability display a more helpless pattern than those with an incremental view. People holding an entity view were more likely to attribute poor performance to lack of ability or skills, and those with an incremental view of ability to lack of effort. On measures of behavioural persistence, fewer individuals with an entity view than those with an incremental view chose to work on the same task after receiving failure feedback. Miller, Behrens, Greene and Newman's (1993) study of 119 students involved in an introductory statistics course found a mastery orientation to be significantly and positively related to persistence. This was not so for social comparison goal scores. The measure of persistence in this study was effort in the face of difficulty, not time on task. Little research has been conducted using more experimental approaches such as time spent on task, or the number of attempts made.

Conclusion

Due to the potential effects on academic achievement, awareness of implicit views of ability, goal orientation endorsement and the role of effort and preference for challenge

may be beneficial for educators (Ablard & Mills, 1996). There are numerous issues that need to be considered in any investigation into implicit theories of ability, goal orientation and behavioural response. This review has focused on implicit views and goal choice and how these affect achievement behaviours, either in an adaptive or maladaptive way. Specifically, links between an entity view of ability and the pursuit of social comparison goals, relative to an incremental view of ability and the pursuit of mastery goals. A number of behavioural responses in relation to this were also examined (for instance, attributional tendencies, affect, anxiety, performance and persistence).

There are still many issues related to implicit theory of ability and goal choice that warrant further investigation. Firstly, further longitudinal studies examining the effects on anxiety, self-esteem and affect are needed to more fully determine the role that implicit theory of ability and goal orientation play in achievement settings. Also studies in natural settings assessing the success of re-training programs, for example programs fostering an incremental view of intelligence and the pursuit of mastery goals, will aid educators in determining the importance of the related theory to individuals' achievement in the long-term. Secondly, the role of effort or level of persistence in the face of challenge needs investigation using other methods than just behavioural choice, for example using measures such as time on task or the number of attempts made and so on. Studies examining the relationship between entity and incremental views of ability, goal orientation and exposure to failure in determining levels of persistence may be of benefit if undertaken.

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Implications of Manipulating Goal Orientation on the Performance of Entity and Incremental Thinkers.

Empirical Study

Abstract

This study investigated links between an entity view of ability (the belief that intelligence is a stable trait that cannot be altered) and the pursuit of social comparison goals (goals that involve vindicating one's ability relative to others, rather than achieving mastery), relative to an incremental view of ability (the belief that ability is a changeable quality that can be enhanced through learning) and the pursuit of mastery goals. Participants (48 entity thinkers and 48 incremental thinkers) were primed for either social comparison or mastery goals following either success or failure feedback. Their performance on a subsequent set of unicursal tasks was then examined. Performance manipulation checks and repeat state anxiety measures confirmed the effectiveness of the performance feedback manipulation. Participants with an incremental view of ability solved more unicursal tasks and spent longer on them than did those with an entity view. While the performance of those with an incremental view was comparable across performance feedback conditions irrespective of whether they were primed for mastery or social comparison goals, participants with an entity view of ability varied in their performance on the basis of goal priming advice. The performance of those holding an entity view of ability improved when primed for mastery relative to social comparison goals. These findings confirm the performance-limiting consequences of social comparison goals for participants with an entity view of ability and suggest potential benefits in encouraging a mastery goal orientation among entity thinkers.

Implicit theories of intelligence refer to our background beliefs about the nature of intelligence (Hong, Chiu, & Dweck, 1995), and our perceived view of its stability (Ablard & Mills, 1996). It has been suggested that how individuals conceive of ability affects achievement behaviours and outcomes (Dweck & Bempechat, 1983; Henderson & Dweck, 1990). Individuals typically subscribe to one of two implicit theories of ability: either that intelligence is a stable trait or a fixed entity that cannot be changed (an entity view), or that intelligence is a malleable, changeable quality that can be increased through one's efforts, known as an incremental view (Dweck & Leggett, 1988). These beliefs are held independently of an individual's actual ability as assessed by measures of intelligence (Elliott & Dweck, 1988), but have a definite impact on cognition and behaviour in academic situations (Ablard & Mills, 1996).

It has been suggested that individuals' implicit views of ability orient them toward particular goals and motivational patterns or ways of responding (Elliott & Dweck, 1988). A social-cognitive model of motivation links type of implicit view (entity or incremental) to goal orientation, the latter of which is thought to predict an individual's behavioural response when faced with challenge (Dweck & Leggett, 1988). Consistent with Dweck and Leggett's (1988) prediction that implicit view and behaviour under stress is mediated by goal orientation, a study by Roedel and Schraw (1995) found no direct link between one's implicit view of ability and behavioural response. However, it is thought that one's implicit view of ability has effects on behaviour and level of performance in the long-term, predicting achievement choices and the demonstration of ability over time, especially following failure (Henderson & Dweck, 1990).

Research examining goal choice consistently links viewing ability as a fixed entity to the endorsement of *social comparison* or *performance* goals, whereby an individual seeks to gain favourable judgements of his or her competence or aims to prevent negative

judgements (Braten & Olaussen, 1998; Dweck, 1996). This results in fostering maladaptive learning patterns that are more susceptible to failure. In comparison, viewing ability as an acquirable skill leads to a *mastery* or *learning* goal orientation where the concern is with increasing one's competence, resulting in more adaptive learning patterns (Clark & Tollefson, 1991; Martocchio, 1994). A number of empirical studies have shown that a mastery goal orientation is associated with more adaptive patterns of behaviour, cognition and affect than is a social comparison goal orientation (Anderman & Midgley, 1997; Clark & Tollefson, 1991; Dweck & Leggett, 1988; Kaplan & Midgley, 1997). Social comparison goal-oriented individuals may avoid challenge and may sacrifice learning opportunities that pose the risk of errors and difficulties (Braten & Olaussen, 1998; Elliott & Dweck, 1988). Although social comparison goals have been consistently linked to the endorsement of an entity view of ability (Dweck & Leggett, 1988; Elliott & Dweck, 1988), there is some debate regarding the link between incremental views of ability and mastery goals, with one study finding an incremental view to be independent of mastery goals (Roedel & Schraw, 1995).

Helpless and Mastery-Oriented Responses

Dweck and Leggett's (1988) theory goes further to propose two response patterns associated with the two goal types, which in turn are related to different implicit theories: specifically, a "helpless" response pattern related to the pursuit of social comparison goals in achievement situations. This pattern is characterised by a concern with demonstrating ability, avoidance of challenge, and giving up in the face of failure (Rhodewalt, 1994). In comparison, the "mastery-oriented" pattern is associated with the pursuit of mastery goals, with interest in increasing competence. The mastery pattern is characterised by seeking challenge, displaying persistence, and increased effort in response to failure (Rhodewalt, 1994). Individuals with an entity view of ability are more likely than those with an

incremental view to display cognitive, affective, and behavioural aspects of helplessness in the face of academic challenges. On the other hand, individuals with an incremental view of ability have an increased likelihood of mastery-oriented responses to academic challenges (Hong, Chiu, & Dweck, 1995; Pintrich, 2000). Evidence in this regard comes from studies where participants have been exposed to false failure feedback, finding an entity view of ability to be linked to the helpless response in terms of cognitive appraisal and behavioural persistence (Dweck & Bempechat, 1983; Hong, Chiu & Dweck, 1995).

There is a body of research linking the setting of social comparison goals to the helpless response that is based on Dweck's theory (Dweck & Leggett, 1988) that behavioural response is mediated by goal orientation. This research has measured both natural goal orientation (Smiley & Dweck, 1994) as well as experimentally manipulated goal orientation by emphasising either evaluative aspects of a task or the value of learning a task (Elliott & Dweck, 1988). Following failure, results suggest that adopting social comparison goals produces a susceptibility to a helpless response. This helpless response is evident in greater negative affect, negative cognitions and a decrease in behavioural persistence compared to those adopting mastery goals (Chiu, Hong & Dweck, 1994; Elliott & Dweck, 1988; Erdley, et al., 1997; Smiley & Dweck, 1994).

Behavioural Correlates

Research has linked implicit views of ability to a number of behavioural correlates such as goal choice, affective extremity, anxiety, effort, locus of control, and persistence. Links have been found between an entity view of ability and social comparison goals (Dweck & Leggett, 1988), anxiety (Martocchio, 1994), effort fears in that individuals with an entity view of ability feel that it is preferable to succeed following little effort than following high effort (Dweck, 1996), and self-handicapping (Rhodewalt, 1994). Nevertheless, relationships between implicit views of ability, goal orientation and persistence have

received little attention, with the few studies investigating these relationships revealing inconsistent findings (Miller, Behrens, Greene & Newman, 1993).

Implicit Views of Ability, Goal Orientation and Performance Effects

Based on Dweck's theory, Miller et al. (1993) predicted that the behaviour of individuals with either a social comparison or mastery goal orientation depends on their level of perceived ability. When individuals with either goal orientation are confident in their ability, their behaviour and performance is similar. It is when individuals doubt their ability that differences arise in their goal choice. Individuals holding an incremental view of ability attempt to achieve mastery, seek challenge and display persistence in the pursuit of goals, irrespective of the individuals' self-concept of ability.

The entity view appears to be dependent on the individual's perceived level of ability, being linked to either a mastery orientation when the individual's perceived level of ability is high, or the helpless orientation when the individual's perceived level of ability is low (Kaplan & Midgley, 1997). Elliott and Dweck (1988) and Smiley and Dweck (1994) found social comparison-oriented individuals with low perceived ability chose less challenging tasks, showed poor performance, reported negative affect, and were less persistent than individuals oriented towards social comparison goals with high perceived ability, or individuals with a mastery goal orientation regardless of ability perceptions. However, there is debate over the hypothesised interaction between perceived skill and achievement goals, with more recent research finding little support for confidence in ability as a moderator between social comparison goals and achievement (Kaplan & Midgley, 1997).

Implicit Views of Ability, Goal Orientation and Persistence

Initial suggestions by Elliott and Dweck (1988) were that persistence was related to the individual's confidence in ability. However, Miller, et al.'s (1993) study of undergraduate

students failed to find any association between perceived ability and persistence as predicted by Dweck's model. This is contrary to previous research findings showing perceived ability to be related to effort expenditure (Elliott & Dweck, 1988). This revealed a further inconsistency in the literature, suggesting that persistence may not be related to confidence in ability, but to goal orientation, which is directly influenced by implicit view of ability (Dweck & Leggett, 1988; Martocchio, 1994). Miller, et al. (1993), found mastery goals to be positively related to persistence, as assessed by survey responses.

Much of the research examining the relationship between implicit views of ability, goal orientation and persistence has used behavioural measures such as survey responses or task choice following failure, evident in whether the student picks the same task, a harder task offering more learning opportunities, or an easier task (Cain & Dweck, 1995; Dweck, 1996; Smiley & Dweck, 1994). For instance Cain and Dweck (1995)) found fewer children with an entity view of ability chose to work on challenging tasks, in this case puzzles, after receiving failure feedback than those with an incremental view. While Elliott and Dweck (1988) and Archer (1994) found fewer individuals oriented to social comparison goals chose to work on more challenging tasks after receiving failure feedback than mastery oriented individuals.

Very little research has examined persistence experimentally through, for example, time spent on a task, or the number of attempts made on a task, or attempted to determine its relationship to individual goal orientation. Research suggests that students with an entity view of intelligence typically exert less effort on challenging tasks and may even avoid such tasks. It is therefore likely that they may underachieve (Ablard & Mills, 1996). As such it seems important to investigate further the role of persistence in terms of effort and actual performance.

The Present Study

The present study examines the relationship between entity and incremental views of ability, performance feedback and goal orientation in determining level of persistence. The assumption tested is that entity views of ability are linked with the pursuit of social comparison rather than mastery goals, with performance limiting consequences, especially following failure.

Participants with either an incremental view of ability ('*incremental thinkers*') or an entity view of ability ('*entity thinkers*') will be exposed to either success or failure feedback on an initial task and then levels of anxiety, performance perceptions and affective reactions will be assessed. Following this exposure to either success or failure participants will be primed for either mastery or social comparison goals and their performance assessed on a second experimental task, a unicursal task.

Expected outcomes.

Following the success or failure feedback, it is expected that there will be no change in anxiety levels for entity and incremental thinkers following success. However, following failure entity thinkers are likely to experience greater anxiety than incremental thinkers. Performance manipulation checks and repeat measures of state anxiety are expected to confirm the effectiveness of the success and failure feedback manipulations. It is also expected that entity thinkers will report more negative assessments in the failure condition. As with other research (Braten & Ollausen, 1998; Roedel & Schraw, 1995) it is expected that scores on a Goals Inventory (Roedel, Schraw & Plake, 1994) will be linked to views of ability, with entity thinkers more strongly endorsing social comparison goals than incremental thinkers.

Performance expectations for the unicursal tasks.

In the present study where participants are primed for either a mastery or social comparison goal orientation, *participants with an incremental view of ability are expected to solve more unicursal tasks and to persist for longer than those with an entity view.* In broad terms it was also expected that overall, *participants would solve more unicursal tasks following success than following failure*, and that they would *solve more tasks following mastery goal priming than following social comparison goal priming.*

Specific predictions were also made following mastery and social comparison goal priming within each of the success and failure conditions for entity relative to incremental thinkers. *Following success, entity thinkers were expected to perform better following mastery goal priming than following social comparison goal priming.* Similarly, *following failure entity thinkers were expected to perform better following mastery goal priming than following social comparison goal priming*. For incremental thinkers however, no performance differences were expected following success or failure for either goal priming condition.

Predictions were also advanced for incremental thinkers relative to entity thinkers within experimental conditions for the number of unicursal tasks solved, with no differences expected for entity relative to incremental thinkers within each of the success mastery and failure mastery conditions. However *differences in the number of unicursal tasks solved were expected for entity relative to incremental thinkers within each of the success social comparison and failure social comparison conditions, with entity thinkers performing poorly relative to incremental thinkers.*

Method

Experimental Design

Participants with either an entity or an incremental view of ability were randomly assigned to one of two performance feedback conditions (noncontingent failure and contingent success), and subsequently either primed for mastery or social comparison goals, rendering the experiment a 2 (views of ability: entity, incremental) * 2 (performance feedback: non-contingent failure, contingent success) * 2 (goal priming advice: mastery goals, social comparison goals) fully crossed between-subjects factorial design. The main dependent measures were measures of state anxiety, performance perceptions and affective reactions, endorsement of state goals (mastery, social comparison) and performance (the number of unicursal tasks solved and the total time spent on a set of unicursal tasks).

Participants

Participants were 96 undergraduate students (N = 33 males, 63 females) enrolled at the University of Tasmania. Participants were selected from a total of 461 undergraduates who completed a measure of implicit views of ability (Hong, Chiu & Dweck, 1995). On the basis of scores determined on the implicit views of ability measure, 48 students who strongly endorsed entity views of ability and 48 students who strongly endorsed incremental views of ability were selected for experimental participation. The students were selected from the bottom and top thirds of trichotomised scores from the Implicit Views of Ability scale. Participants' ranged in age from 17 to 35 years (M = 20.97, SD = 3.28).

Instruments

Pre-screening Measures

The implicit views of ability scale.

The *Implicit Views of Ability Scale* (Hong, Chiu & Dweck, 1995) comprises 3 items: "You have a certain amount of intelligence and you really can't do much to change it", "Your intelligence is something about you that you can't really change very much", and "You can learn new things, but you can't really change your basic intelligence". Items are formatted on six-point scales ranging from (1) "strongly agree" to (6) "strongly disagree". The three items comprising this scale were used to screen potential participants in the present study, with possible scores ranging from 3 to 18. For the purposes of the study individuals with low scores were taken as endorsing an entity view of ability, whilst those obtaining high scores were taken as endorsing an incremental view. Dweck, Chiu and Hong (1995a) report high internal reliability across studies (αs ranging from .94 to .98) for the *Implicit Views of Ability Scale*, and a test-retest reliability of .80 for this Scale over a 2-week period. The Cronbach coefficient alpha for this Scale in the present study was .97.

Experimental Measures

The goals inventory.

The *Goals Inventory* (Roedel, Schraw & Plake, 1994) consists of 25-items reflecting attitudes and behaviours associated with mastery and social comparison goal orientations. Items are formatted on a 5-point scale with end-point designations ranging from (1) "very true" to (5) "not at all true". Sample items include: "I persevere even when I am frustrated by a task", reflecting a mastery goal item, and "It is important to me to always do better than others", reflecting a social comparison goal item. Roedel, Schraw and Plake (1994) identify two subscales (mastery and social comparison goals) with internal consistencies of .80 and .75 respectively. Test-retest reliabilities of .73 and .76 have been reported for the

two subscales. Coefficient alphas for this scale from the present study were .77 for the mastery goal subscale and .84 for the social comparison subscale. Scores from the total inventory were taken as a measure of overall goal orientation.

State-Trait Anxiety Inventory.

Odd- and even-numbered items from the Speilberger, Gorsuch, Lushene, Vagg & Jacobs (1983) *State-Trait Anxiety Inventory* (STAI) were used to create parallel forms of the questionnaire as a means of assessing the impact of performance feedback on individuals' anxiety levels before and after success and failure feedback on the simultaneous discrimination task. Speilberger et al. (1983) license parallel forms based on odd- and even-numbered items. This option was followed in order to minimise any tendency on the part of participants to respond to items on the second administration of the STAI in a manner that was consistent with their responses on the first occasion. This was a genuine concern as the two administrations were completed within a short period of time (approximately 10 minutes). Thompson and le Fevre (1999) report a KR-20 (internal consistency) of .89 for the first administration of the STAI and .88 for the second administration. Coefficeint alphas in the present study were .80 for STAI-I and .83 for STAI-II. Possible scores on the STAI range from 10 to 40.

State goals scale.

The State Goals Scale was devised for this study to assess endorsement of mastery or social comparison goals during the unicursal cognitive task and following the goal priming advice. It consisted of 10-items, formatted on 7-point scales ranging from (1) "not at all true of me" to (7) "very true of me". Sample items include: "I thought about how I was going compared to others", reflective of a social comparison goal item and "I felt satisfied because I was trying hard", reflective of a mastery goal item. For the present study, coefficient alphas for social comparison and mastery goals were .81 and .80 respectively.

Possible scores ranged from 10 to 70, with for the purposes of this study, lower scores indicating endorsement of a mastery goal orientation. (See Appendix A).

Performance perceptions and affective reactions.

Three items provided an assessment of the effectiveness of the success and failure manipulations. Participants were asked to assess *how well* they performed on the simultaneous discrimination task, *how happy* they were with their performance, and *how satisfied* they were with their performance. Two single-item measures were also used to assess the extent to which participants felt they were *in control* of the outcome of their performance, and *how anxious* they felt during their performance. Participants registered their responses on seven-point scales with end-point designations appropriate to each item. The coefficient alpha for the three performance manipulation check items was .93. (For the full record of items see Appendix B).

Cognitive Tasks

Simultaneous discrimination task.

Four ten-trial, computerised simultaneous discrimination tasks used by Thompson, Davidson and Barber (1995) were used to create experiences of success and noncontingent failure. Noncontingent feedback involves any form of feedback that is either out of kilter with actual performance or otherwise excludes people from adequately diagnosing the cause of their performance outcome (Thompson, in press). In this study the feedback was entirely false, that is participants received failure feedback regardless of their response, ensuring that everyone in the failure condition failed to the same degree. If contingent, rather than noncontingent, failure had been used control over this measure would not be gained, as everyone's experience of failure would be different, thus making it problematic experimentally (Thompson, in press).

Each problem began with the presentation of two figures, one displayed on the left of

the computer screen, the other on the right of the computer screen. These figures consisted of two letters of the alphabet, A or T, and varied in terms of four features: the letter itself (A or T), the colour of the letter (black or white), the size of the letter (small or large), and the shape of the border in which the letters were contained (square or circle). These attributes varied systematically across the ten displays used in the experiment (see Appendix C for an example of the simultaneous discrimination task).

Participants were required to identify just one feature that was predetermined by the experimenter for each of the four problems (e.g. black, square, small, the letter T), and indicate whether they believed the correct feature was contained in the display on the left of the screen or that on the right. In the noncontingent failure condition, feedback generated by the computer took no regard of students' responses. Instead, a fixed sequence of responses was given that varied for each of the four problems. Students in fact received 50% reinforcement schedules (Correct or Incorrect) on all four problems. The reinforcement schedules, taken from Thompson et al. (1995), were as follows: (1) C-I-I-C-C-I-I-C-C-I; (2) I-C-I-C-C-I-C-I-C-I; (3) I-C-I-C-I-C-C-I-C-I; (4) C-C-I-C-I-I-C-I-C-I. As a consequence of this bogus feedback, all participants failed to identify the correct feature at the conclusion of each of the four problems, and were given explicit feedback to this effect by the experimenter. As the success of the noncontingent failure manipulation depended on participants being successfully duped by the false feedback given by the experimenter, it was necessary to ascertain during debriefing whether any participant suspected the accuracy of the feedback generated by the computer. At the conclusion of the study, no participant indicated that he or she harboured suspicions about the accuracy of this feedback.

In the success condition, feedback generated by the computer corresponded with participants' responses. As a consequence, all participants succeeded in solving all four

problems, and were given explicit feedback to this effect, problem by problem. At the conclusion of the simultaneous tasks, the experimenter took care to emphasise to participants that they had successfully solved all four problems.

Unicursal Task.

Sixteen tracing puzzle (unicursal) tasks, eight of which were soluble, and eight insoluble (Thompson & Richardson, 2001) were used in the present study to assess persistence. These tasks were presented on computer (see Appendix D for an example of a unicursal task). Participants were required to trace geometric figures in one continuous line by clicking on vertices using the mouse button without retracing any given line. Participants were allowed multiple attempts at tracing any given puzzle. The computer supplied feedback in the form of a large blue tick presented on the screen for a correctly traced task. Dependent measures recorded by the computer were the time (in seconds) spent on each unicursal task and the number of puzzles correctly traced.

Procedure

Selection of Participants

Participants were drawn from a sample of 461 students who completed the Implicit Views of Ability Scale (Hong, Chiu & Dweck, 1995). This pool of students was rank ordered according to their view of ability scores. These scores were then trichotomised, with those with incremental views of ability within the top third of the distribution of scores while those with entity views were in the bottom third. Participants who fell into either the top or bottom third of scores were deemed eligible to participate in the experiment. This is a well-established approach, having been used by a number of researchers (e.g. Harris & Synder, 1986; Kernis, Grannemann & Mathis, 1991). Participants (48 entity thinkers and 48 incremental thinkers) were randomly allocated to either success or failure performance feedback conditions using the simultaneous

discrimination task. These participant groups were then further divided into those primed for mastery goals and those primed for social comparison goals. As such, participants were allocated to one of eight experimental conditions, with 12 participants in each group.

Experimental Procedure

On arrival at the laboratory, participants were first required to read an information sheet containing details of the experiment and sign a statement of informed consent. The experimenter informed participants that the purpose of the experiment was to examine performance perceptions involved in problem-solving tasks. All participants were further advised that they would be completing two tasks: a simultaneous discrimination task and unicursal tasks, and that the experiment assessed factors related to performance on these tasks.

Before commencing the simultaneous discrimination task, participants completed the Goals Inventory (Roedel, Schraw & Plake, 1994) and the first of two parallel forms of the STAI (Speilberger et al., 1983). The instructions given to participants for the simultaneous discrimination task closely resembled those given by Thompson et al. (1995). Directly following this task, participants completed the second of the two parallel forms of the STAI, items that assessed the effectiveness of the success and failure manipulations and affective reactions prior to attempting the unicursal tasks.

Prior to the commencement of the unicursal tasks, participants were primed either for mastery or social comparison goals. The mastery goal priming advice emphasised that the unicursal tasks were "problems that everyone can solve, it just takes persistence", while the social comparison advice informed participants "most people solve around four problems". (For the full record of goal priming instructions see Appendix E).

Participants then completed the 16-unicursal tasks, presented on computer. These tasks were used to assess practice effort and performance following success and failure for entity

and incremental thinkers. Eight of these tasks were soluble and eight were insoluble. Participants were then left to attempt the unicursal problems and advised to let the experimenter know when they had finished. During this time, the computer recorded the total time in seconds that participants spent working on the problems and the number of problems correctly solved.

Following the experiment, participants completed a state goal measure relating to their goal endorsement during the unicursal task and following the goal priming advice. Students were then debriefed and thanked for their participation. In debriefing, participants exposed to non-contingent failure were run through the success condition of the experiment in order to reinstate any loss in self-esteem.

Results

Analysis Strategy

Separate 2 (views of ability: entity, incremental) * 2 (performance feedback: non-contingent failure, contingent success) ANOVAs were completed for dependent variables prior to the goal priming advice, followed by 2 (views of ability: entity, incremental) * 2 (performance feedback: non-contingent failure, contingent success) * 2 (goal priming advice: mastery goals, social comparison goals) ANOVAs after goal priming. Post hoc tests (Fisher PLSD) were used to test for significant differences between means where appropriate. In all analyses, the alpha level was set at .05. There were no missing values for any dependent measure.

In view of the fact that the majority of participants were female ($N = 63$ females, 33 males) the number of males in cells was low (ranging from two to five). As such, analyses involving gender were not feasible. No gender differences were apparent for views of ability (that is endorsement of entity and incremental views) as assessed by the implicit

theory pre-screening questionnaire for the experimental participants ($p = .38$; $M_{MALES} = 11.39$, $SD_{MALES} = 5.41$; $M_{FEMALES} = 10.48$, $SD_{FEMALES} = 4.56$).

Goals Inventory

Based on the experimental data obtained from the Goals Inventory (Roedel, Schraw & Plake, 1994), a significant main effect for views of ability was found: $F(1, 94) = 45.262$, $p < .0001$. As expected, entity thinkers endorsed social comparison goals ($M_{ENTITY} = 46.98$, $SD_{ENTITY} = 5.11$) to a greater extent than incremental thinkers ($M_{INCREMENTAL} = 38.81$, $SD_{INCREMENTAL} = 6.68$).

Performance Perceptions and Affective Reactions

Immediately following success or failure feedback on the simultaneous discrimination task, participants completed three performance manipulation check measures assessing *how well* they performed on the task, *how happy* they were with their performance and *how satisfied* they were with their performance. These items served as checks of the effectiveness of the success and failure feedback manipulations, with those in the success condition rating more positively. They also responded to two single-item measures assessing the extent to which they felt *in control* of the outcome of their performance and *how anxious* they were during their performance. For all of these items, there were main effects for performance feedback condition, in each case $ps < .0001$. For each of these dependent measures, significant differences were evident between the success and non-contingent failure conditions, with participants reporting they were less happy, less satisfied, less in control of their performance in the failure condition relative to the success condition. (See Table 1).

An interaction involving views of ability and performance feedback was apparent for one of the three manipulation check items, this being for perceptions of *how well* they

performed on the simultaneous discrimination task: $F(1, 88) = 5.178, p = .03$. While there were no differences between entity and incremental participants in their ratings of *how well* they performed in the success condition ($M_{ENTITY} = 2.92$, $SD_{ENTITY} = 1.25$; $M_{INCREMENTAL} = 3.04$, $SD_{INCREMENTAL} = .99$), in the failure condition scores for *how well* they performed were more positive for incremental thinkers ($M_{INCREMENTAL} = 4.79$, $SD_{INCREMENTAL} = 1.32$) relative to entity thinkers ($M_{ENTITY} = 5.75$, $SD_{ENTITY} = 1.07$: $F(1, 46) = 7.628, p = .01$).

An interaction between performance feedback and views of ability was also evident for the single-item measure assessing perceptions of control: $F(1, 88) = 5.861, p = .02$, with entity thinkers exposed to failure feedback reporting greater lack of control relative to incremental thinkers ($M_{ENTITY} = 5.71$, $SD_{ENTITY} = 1.37$; $M_{INCREMENTAL} = 4.50$, $SD_{INCREMENTAL} = 1.18$; $p = .003$. On the other hand, entity and incremental thinkers did not differ in their *perceptions of control* following success feedback ($M_{ENTITY} = 3.50$, $SD_{ENTITY} = 1.62$; $M_{INCREMENTAL} = 3.63$, $SD_{INCREMENTAL} = 1.31$; $p = .754$).

Table 1: *Means and Standard Deviations for Entity and Incremental Thinkers following Performance Feedback across Performance Perceptions.*

	Entity Thinkers				Incremental Thinkers			
	Success		Failure		Success		Failure	
Questions	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*
How well	2.92	(1.25)	5.75	(1.07)	3.04	(.99)	4.79	(1.32)
How happy	2.71	(.99)	5.42	(.72)	3.00	(1.41)	4.92	(1.14)
How satisfied	2.67	(1.20)	5.75	(.61)	2.83	(1.61)	5.42	(.78)
Perceptions of control	3.50	(1.62)	5.71	(1.37)	3.63	(1.31)	4.50	(1.18)
How anxious	2.67	(1.76)	4.46	(1.29)	2.88	(1.36)	3.96	(1.37)

State Anxiety

Table 2 shows means and standard deviations for parallel forms of the STAI for incremental and entity thinkers following success and failure feedback. State anxiety was assessed immediately prior to, and immediately following the simultaneous discrimination task. Contrary to prediction, an ANOVA performed on the STAI-2 failed to reveal a significant main effect or interaction for implicit view of ability, suggesting no differences based on views of ability for levels of anxiety following failure: $F(1, 96) = 1.391, p = .24$.

Analysis for state anxiety in relation to the performance feedback supported the success of the noncontingent failure feedback manipulation. While for the STAI-1 both groups reported comparable levels of anxiety: $F(1, 94) = .136, p = .71$ ($M_{SUCCESS} = 17.33$, $SD_{SUCCESS} = 4.18$; $M_{FAILURE} = 17.06$, $SD_{FAILURE} = 2.88$), for the STAI-2 the failure feedback group ($M_{FAILURE} = 20.58$, $SD_{FAILURE} = 3.38$) reported significantly greater anxiety levels than the success feedback group ($M_{SUCCESS} = 16.13$, $SD_{SUCCESS} = 4.06$: $F(1, 94) = 34.259, p < .0001$). A significant increase in anxiety from pre- to post-test for failure feedback participants ($p < .0001$) was observed, while those in the success condition reported a significant decrease in anxiety levels post-test: $t(47) = 3.574, p = .0008$.

Table 2. *Means and Standard Deviations for STAI-1 and STAI-2 for Views of Ability and Performance Feedback.*

Views of Ability	STAI-1		STAI-2			
			Success		Failure	
	M	*SD*	*M*	*SD*	*M*	*SD*
Entity Thinkers	17.52	(3.52)	16.63	(3.87)	21.13	(3.28)
Incremental Thinkers	16.88	(3.64)	15.63	(4.26)	20.04	(3.46)

State Goal Scale

As expected, based on data from the state goal orientation measure – assessing goal orientation on the unicursal task, a main effect for goal priming advice was found: $F(1, 96) = 4.78, p = .03$. Those primed for social comparison goals prior to the unicursal task more strongly endorsed a social comparison goal orientation than those primed for mastery goals ($M_{SC} = 30.17$, $SD_{SC} = 7.93$; $M_{MASTERY} = 27.25$, $SD_{MASTERY} = 7.38$). This finding supports the effectiveness of the goal orientation manipulation and is consistent with studies demonstrating the induction or alteration of individual goals through differing emphasis on instructions (Archer, 1994; Elliott & Dweck, 1988).

Performance Measures

Two dependent measures were recorded for performance on the unicursal task: the number of unicursal tasks solved and the total time spent on the tasks. Separate analyses of variance were performed for each dependent measure.

Number solved

For the number of unicursal tasks solved, a main effect was evident for performance feedback: $F(1, 88) = 4.365$, $p = .04$, with participants solving more unicursal tasks following success ($M_{SUCCESS} = 7.44$, $SD_{SUCCESS} = .94$) than following failure ($M_{FAILURE} = 7.02$, $SD_{FAILURE} = 1.26$). Main effects for views of ability ($p = .008$) and goal orientation ($p < .0001$) were also evident, however they were subsumed by a significant interaction between views of ability and goal priming advice: $F(1, 88) = 4.365$, $p = .04$ (see Figure 1).

As predicted, following success entity thinkers performed better following mastery goal priming ($M_{MASTERY} = 7.5$, $SD_{MASTERY} = .52$) than following social comparison goal priming ($M_{SC} = 6.58$, $SD_{SC} = 1.44$: $F(1, 22) = 2.91$ $p < .04$). Similar results were evident following failure feedback in that entity thinkers again performed better following mastery goal priming ($M_{MASTERY} = 7.67$, $SD_{MASTERY} = .49$) than following social comparison goal priming ($M_{SC} = 6.08$, $SD_{SC} = 1.31$: $F(1, 22) = 15.33$, $p = .0007$). On the other hand no performance differences were evident for incremental thinkers following success or failure for either goal priming condition. That is, unlike entity thinkers, incremental thinkers performed comparably across all experimental conditions ($M_{SUCC/MAST} = 7.83$, $SD_{SUCC/MAST} = .39$; $M_{SUCC/SC} = 7.83$, $SD_{SUCC/SC} = .39$; $M_{FAIL/MAST} = 7.58$, $SD_{FAIL/MAST} = .52$; $M_{FAIL/SC} = 6.75$, $SD_{FAIL/SC} = 1.66$). It is also noteworthy that while entity thinkers differed across the success, social comparison and failure, mastery conditions ($M_{SUCC/SC} = 6.58$, $SD_{SUCC/SC} = 1.44$; $M_{FAIL/MAST} = 7.67$, $SD_{FAIL/MAST} = .49$: $F(1, 22) = 6.06$, $p = .02$), incremental thinkers did not ($M_{SUCC/SC} = 7.83$, $SD_{SUCC/SC} = .39$; $M_{FAIL/MAST} = 7.58$, $SD_{FAIL/MAST} = .52$).

Furthermore, as predicted entity thinkers primed for mastery goals ($M_{ENT/MAST} = 7.58$, $SD_{ENT/MAST} = .50$) performed comparably to incremental thinkers primed for mastery goals

($M_{INCR/MAST}$ = 7.71, $SD_{INCR/MAST}$ = .46: F (1, 46) = .799, p = .38) regardless of whether they received success or failure feedback. However, as expected differences began to emerge when participants were primed for social comparison goals: F (1, 46) = 6.161, p = .02.

As predicted results revealed that under the failure condition and primed for social comparison goals, entity and incremental participants were not differentiated in the number of unicursal tasks solved (M_{ENTITY} = 6.08, SD_{ENTITY} = 1.31; $M_{INCREMENTAL}$ = 6.75, $SD_{INCREMENTAL}$= 1.66), however entity thinkers primed for social comparison goals and exposed to success (M_{ENTITY} = 6.58, SD_{ENTITY}= 1.44) solved significantly fewer unicursal tasks than incremental thinkers in the same experimental condition ($M_{INCREMENTAL}$ = 7.83, $SD_{INCREMENTAL}$= .39: F (1,22) = 8.390, p = .008).

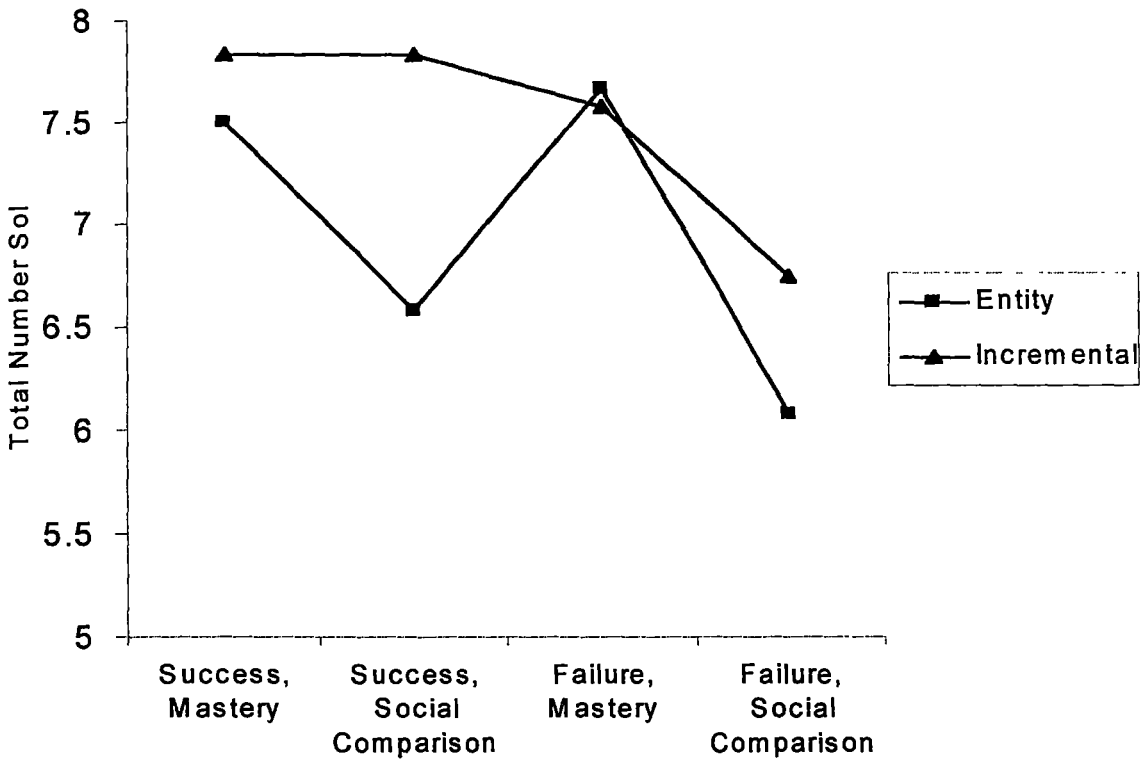

Figure 1: Interaction between performance feedback, views of ability and goal orientation for the number of unicursal problems correctly solved.

Total Time Spent on Task

For the second measure of performance, the total time spent on the unicursal tasks, main effects for views of ability: $F(1, 88) = 32.465$, $p < .0001$) and goal orientation: $F(1, 88) = 3.913$, $p = .05$) were evident, with incremental thinkers persisting for longer on the unicursal tasks than entity thinkers ($M_{INCREMENTAL} = 2247.85$, $SD_{INCREMENTAL} = 426.11$; $M_{ENTITY} = 1796.35$, $SD_{ENTITY} = 370.04$, respectively) within all experimental conditions. Participants primed for mastery goals ($M_{MASTERY} = 2100.48$, $SD_{MASTERY} = 402.33$) spent more time on the

unicursal tasks than those primed for social comparison goals (M_{SC} = 1943.73, SD_{SC} = 498.18).

Not only did incremental thinkers spend longer on the unicursal tasks (in seconds), they also performed comparably across experimental conditions irrespective of performance feedback or goal priming advice ($M_{SUCC/MAST}$ = 2444.58, $SD_{SUCC/MAST}$ = 282.44; $M_{SUCC/SC}$ = 2199.08, $SD_{SUCC/SC}$ = 474.90; $M_{FAIL/MAST}$ = 2179.42; $SD_{FAIL/MAST}$ = 331.19; $M_{FAIL/SC}$ = 2168.33, $SD_{FAIL/SC}$ = 551.35). However, entity thinkers again exhibited differing performances when primed for mastery or social comparison goals. In the success condition there was no significant difference in the time spent on task for entity thinkers primed for either mastery or social comparison goals $M_{MASTERY}$= 1772.92, $SD_{MASTERY}$ = 431.08; M_{SC} = 1824.17, SD_{SC} = 310.72). On the other hand, following failure feedback the goal priming advice appears to have had an effect, in that entity theorists primed for mastery goals (M = 2005.00, SD = 231.01) spent significantly longer on task than entity thinkers primed for social comparison goals following exposure to failure (M = 1583.33, SD = 388.44, p = .05). Figure 2 displays this interaction between performance feedback, views of ability and goal priming advice. In general, Table 3, provides a summary of key findings for students with an entity view of ability relative to those with an incremental view of ability.

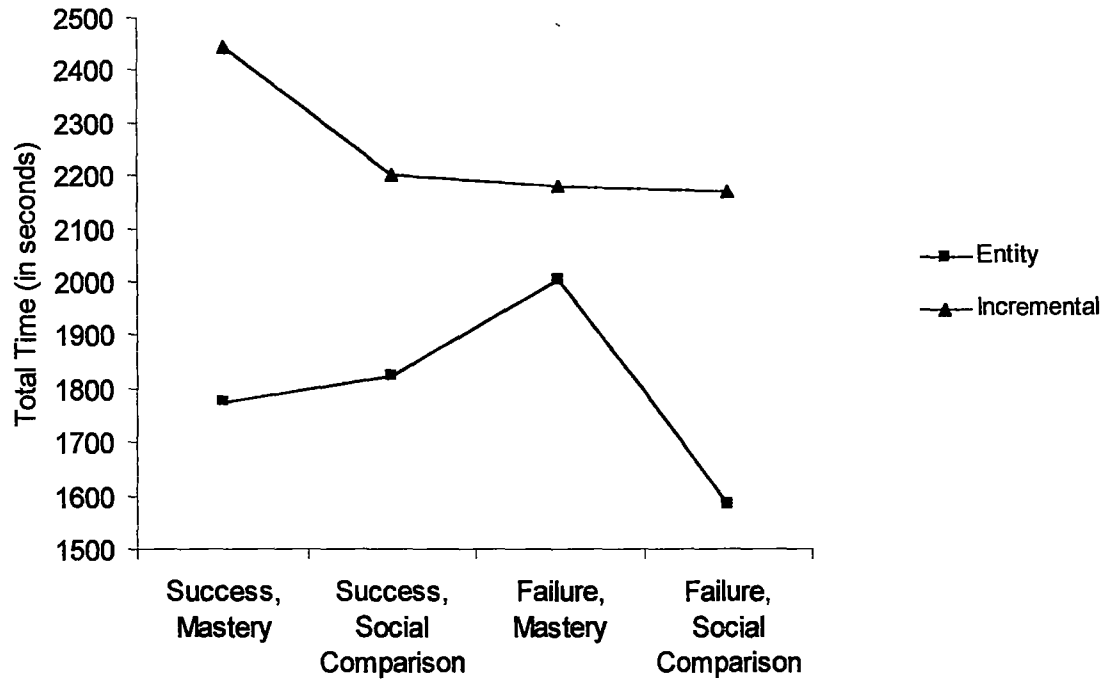

Figure 2: The interaction between performance feedback, views of ability and goal orientation for the total time spent on the unicursal tasks.

Table 3. *Significant outcomes for entity thinkers relative to incremental thinkers on several key measures.*

Key Measure	Entity Thinkers	Incremental Thinkers
Endorsement of social comparison goals	Higher	Lower
Endorsement of mastery goals	Lower	Higher
Perceptions of how well they performed following failure	Lower	Higher
Perceptions of lack of control following failure	Higher	Lower
Number of unicursal tasks solved	Lower	Higher
Time spent on unicursal tasks	Lower	Higher
Performance following mastery goal advice relative to social comparison advice	Improved	No change

Discussion

The present study tested the assumption that holding an entity view of ability is linked with the pursuit of social comparison goals, with performance limiting consequences especially evident following failure feedback. A further assumption tested was that the goal orientation an individual adopts can be manipulated, having an impact on achievement for participants with an entity view of ability only, not for participants with an incremental view of ability. Overall, the results of the study support these predictions. There were differences in performance for participants with entity and incremental views of ability, with entity thinkers solving fewer unicursal tasks and spending less time on the tasks relative to incremental thinkers. When primed for mastery goals (whether exposed to success or failure) the performance of participants with an entity view of ability improved relative to when they were primed for social comparison goals, irrespective of whether they were primed for success or failure feedback.

Anxiety and Performance Perceptions Following Failure

The finding that participants exposed to failure feedback reported feeling less happy, less satisfied, less in control and more anxious than those in the success condition supports the effectiveness of the performance feedback manipulations. It was expected that this more negative reaction would be maximised for those with an entity view of ability in the failure condition. Partial support for this was found in that for one of the three performance perceptions, participants holding an entity view of ability, following failure, rated themselves more negatively in terms of how well they felt they performed. On a single-item measure those with an entity view of ability also reported being less in control than those with an incremental view in the same condition. These findings are consistent with other research reporting that individuals with an entity view of ability exhibit greater negative affect following failure (Ablard & Mills, 1996; Dweck, Chiu & Hong,

1995b; Henderson & Dweck, 1990). Research, including the present study, has consistently highlighted that the achievement of entity and incremental thinkers only really begins to diverge when they are faced with setbacks and challenges.

Implicit Views of Ability and Goal Orientation

The finding that those with an entity view of ability more strongly endorsed social comparison goals is consistent with reports that individuals subscribing to an incremental view pursue mastery goals while those with an entity view pursue social comparison goals, evaluating their performance and ability relative to others (Braten & Ollausen, 1998; Dweck & Leggett, 1988; Roedel & Schraw, 1995). Results on the state goal measure showed that those given social comparison oriented priming advice prior to the unicursal tasks, more strongly endorsed that orientation than individuals primed for mastery goals, demonstrating that the natural goal orientation of individuals can be altered to some degree through instructional priming.

Links with Performance and Persistence

As research suggests that performance effects are not usually found until academic work becomes more difficult requiring persistence in the face of failure (Dweck, 1996), it was expected that a decrease in performance (registered in terms of fewer unicursal tasks solved and less time spent on task) would be evident for participants with an entity view of ability in the failure condition. Entity thinkers did solve fewer unicursal tasks ($p = .008$) and spent less time on them ($p = .0001$) than incremental thinkers. Participants holding an incremental view of ability performed at a similar level regardless of whether they received failure or success feedback or whether they were primed for mastery or social comparison goals. However those with an entity view did not. This suggests that individuals with an incremental view of ability, who tend to endorse mastery goals, are unresponsive to social comparison goal priming. However, those holding an entity view

of ability were responsive to mastery goal priming, performing better following mastery goal priming than following social comparison goal priming. This information has implications for teachers, psychologists and counsellors working in schools, in that emphasis on mastery goals and the improvement of skills, relative to evaluative goals may improve performance of students with an entity view of ability.

Overall, findings of this investigation confirm previous results suggesting incremental thinkers with a mastery goal orientation display greater persistence than do individuals with an entity view of ability endorsing social comparison goals (Archer, 1994; Miller, et al., 1993).

Limitations of the Study

The study was conducted in a laboratory setting using university students only, and as such lacks the ecological validity of a naturalistic, longitudinal study. This study also assessed participants' perceptions of the role of effort through the Goal Inventory questionnaire (Roedel, Schraw & Plake, 1994) and later the effectiveness of the goal priming advice with a state goal measure. Both these measures follow traditional goal theory and break goal orientations down into two major goals: mastery- (or task-oriented) goals and social comparison (or performance) goals. These two achievement goals have received the most attention, especially in relation to implicit views of ability (Archer, 1994; Elliott & Dweck, 1988; Miller, et al., 1993; Roedel & Schraw, 1995). However, revised goal theory suggests that social comparison or performance goals have two components: approach - the desire to demonstrate competence, and avoidance –avoiding demonstrating incompetence or lack of ability (Leondari & Gialamas, 2002; Miller et al., 1993). Little research has utilised these three goal orientations to examine the possibilities of using instructional changes to encourage the adoption of a particular goal orientation. This study restricted the measurement of goal orientation to mastery and social comparison goals only as

research suggests that the revised goal theory perspectives as well as traditional goal theory are both applicable to achievement in schools (Pintrich, 2000). A further limitation of this study is the assumption that entity and incremental views of ability, and mastery and social comparison goal orientations are uni-dimensional in nature. Although historically (Dweck & Leggett, 1988), disagreement with an entity view or a social comparison goal orientation has been taken as endorsement of an incremental view and a mastery orientation there is some debate over the accuracy of this assumption, and that while these constructs may be negatively correlated they do not necessarily lie at opposite ends of the one continuum as operationalised in the present study. This needs to be assessed in future research in this area.

Directions for Further Research

The present study, as with studies by Archer (1994), Ames (1992) and Ames and Archer (1988) demonstrates that the emphasis placed on task instructions can influence performance. This highlights potential outcomes that may occur from encouraging entity thinkers to pursue mastery goals or to endorse a more incremental view of ability. Studies assessing the longevity of this change in goal orientation or implicit view of ability will assist in further development of instructional programs to determine the possible success of emphasising mastery goals relative to social comparison goals, and an incremental view relative to an entity view of ability.

Studies might also assess the longevity of changes in goal orientation through teaching and instructional change. Previous studies have shown that the instructional environment within a classroom can promote a mastery or social comparison goal orientation (Ames, 1992). However, more information is needed regarding specific instructional processes for encouraging the adoption of mastery goals and incremental views of ability, especially for entity thinkers.

Conclusion

The performance-limiting consequences of social comparison goals for entity thinkers has been demonstrated, suggesting the need for individuals with an entity view of ability to be encouraged to pursue mastery goals in achievement situations. In terms of performance, individuals with an incremental view of ability achieved at a comparable level regardless of performance feedback or goal advice. Those holding an entity view of ability on the other hand exhibited different performances depending on the goal advice given. This study further highlighted that it is in their reaction to failure that entity and incremental thinkers really differ. As stated previously, these issues have implications for educating individuals with an entity view of ability by either the manipulation of their natural goal orientation or the manipulation of their implicit view of ability to a more adaptive one.

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Appendix A

State Goals Scale

Read each of the following statements and then circle the appropriate number to indicate the extent to which the statement applied to you **WHILE YOU WERE WORKING ON THE UNICURSAL TASK.**

1. I thought about how I was doing compared to others.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

2. I persevered at the task even when it got tough.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

3. I thought about what would happen if I failed.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

4. I enjoyed the challenge of the task.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

5. I felt anxious.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

6. I felt satisfied because I was trying hard.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

7. I felt nervous.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

8. I felt confident.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

9. I thought that if I didn't do well people would think I was stupid.
   Not at all true of me 1__2__3__4__5__6__7 Very true of me

10. I was determined to do my best.
    Not at all true of me 1__2__3__4__5__6__7 Very true of me

Appendix B

Performance Perceptions and Affective Reactions

1. Relative to your expectations, how well did you perform on this task?

Pretty much how I expected						Much worse than I expected
1	2	3	4	5	6	7

2. How happy are you about your performance?

Very happy about my performance						Very unhappy about my performance
1	2	3	4	5	6	7

3. How satisfied are you with your performance on the simultaneous discrimination task?

Very satisfied						Not at all satisfied
1	2	3	4	5	6	7

4. To what extent did you feel you were in control of the outcome of your performance on the simultaneous discrimination task?

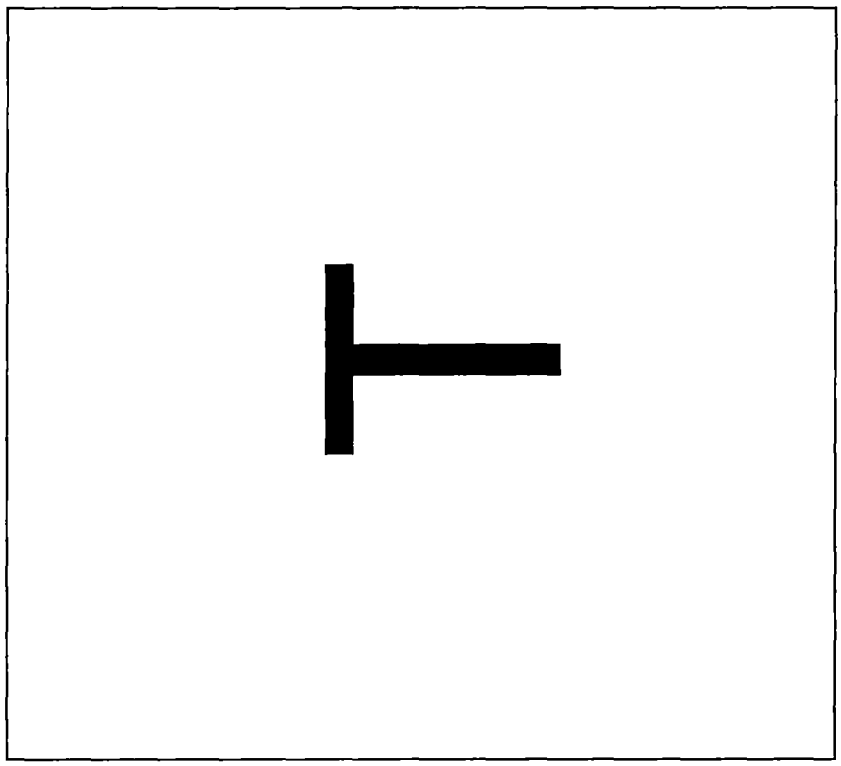
Very much in control						Not at all in control
1	2	3	4	5	6	7

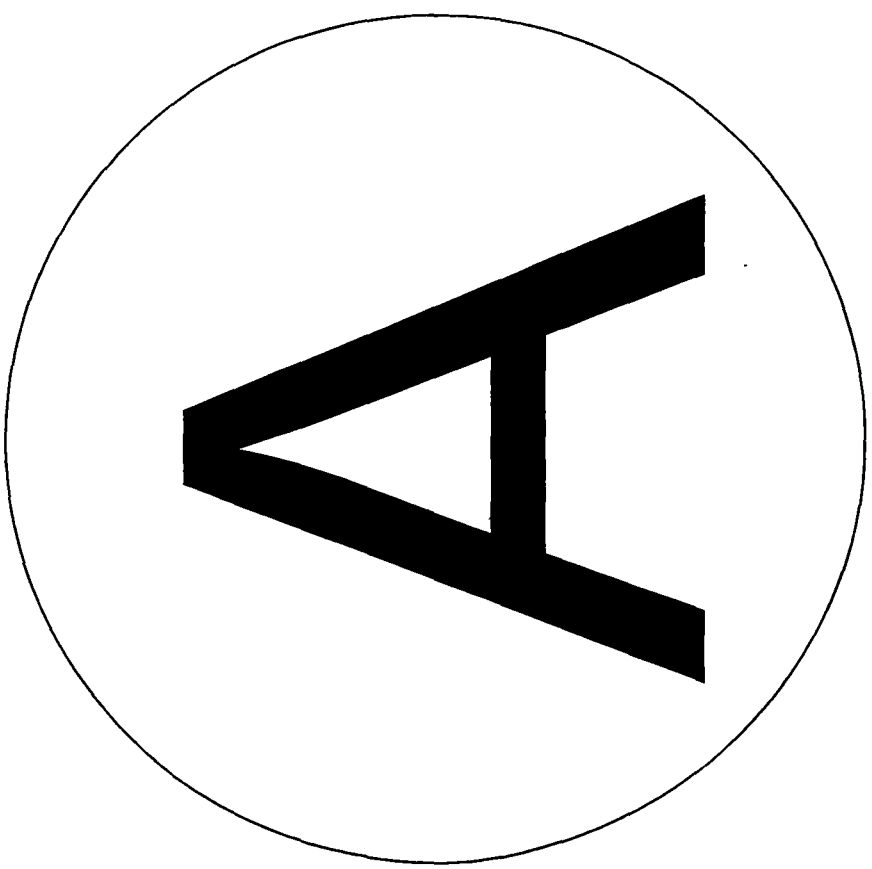
5. How anxious did you feel whilst working on the simultaneous discrimination task?

Not at all anxious						Very anxious
1	2	3	4	5	6	7

Appendix C

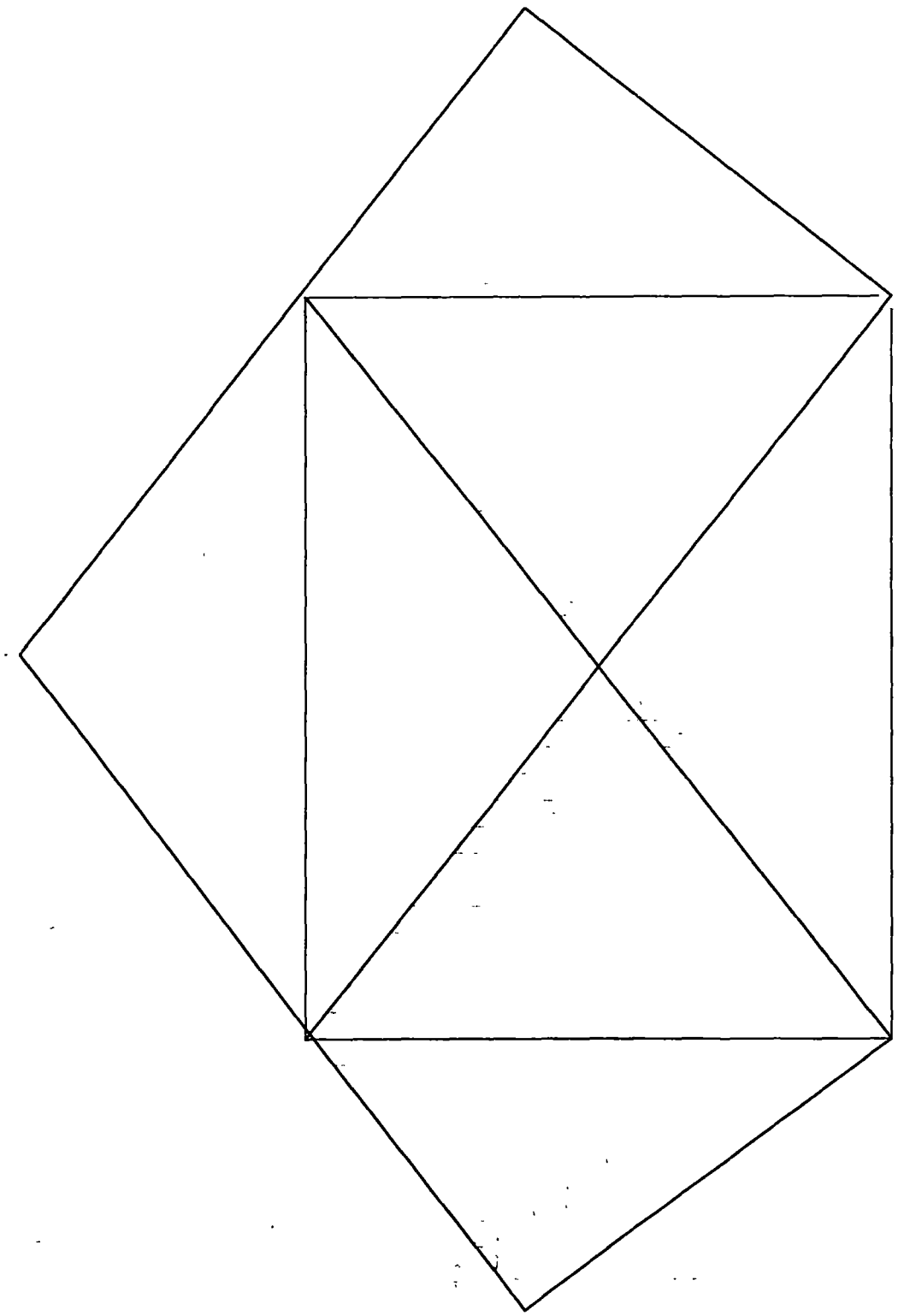
Simultaneous Discrimination Task





Appendix D

Unicursal Task



Appendix E

Goal Priming Advice

Mastery Advice

These are problems that everyone can master it just takes persistence. There are 16 problems in all. Some of the problems are soluble and some are insoluble. I would like you to stick at these problems until you are sure you have solved all the problems that are soluble. But I'm not going to tell you how many are soluble and how many are not. What I want is for you to stick at them until you are confident you have solved all that can be solved.

You can break off at any point and go on to a new problem if you want or alternatively, go back to a problem you have previously worked on. You can take as long as you want, but I will have to stop you at a certain point as we don't have unlimited time. Remember these are problems that everyone can master. Go for it!

Social Comparison Advice

These are problems that vary in their level of difficulty. Some are easy and others much harder, there are also some that are insoluble. But I'm not going to tell you how many are soluble and how many are not. It is up to you how many problems you aim to solve, however we know from using these problems in previous studies that most people solve around 4 problems. So, on this basis you might be happy to just solve around 4 problems.

You can break off at any point and go on to a new problem if you want or alternatively, go back to a problem you have previously worked on. You can take as long as you want, but I will have to stop you at a certain point as we don't have unlimited time. Go for it!